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REGION I

RECORD OF DECISION

KEARSARGE METALLURGICAL CORPORATION

CONWAY, NEW HAMPSHIRE

SEPTEMBER 28, 1990

DECLARATION FOR THE RECORD OF DECISION

Kearsarge Metallurgical Corporation
Conway, New Hampshire

STATEMENT OF PURPOSE

This Decision Document presents the selected remedial action for the Kearsarge Metallurgical Corporation Site in Conway, New Hampshire, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Contingency Plan (NCP), and 40 CFR Part 300 et seq., as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

The State of New Hampshire concurs with the selected remedy.

STATEMENT OF BASIS

This decision is based on the administrative record which has been developed in accordance with Section 113 (k) of CERCLA and which is available for public review at the Conway Public Library in Conway, New Hampshire and at the Region I Waste Management Division Records Center at 90 Canal Street, Boston, Massachusetts. The Administrative Record Index (Appendix D to the ROD) identifies the items which comprise the Administrative Record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health or welfare or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Kearsarge Metallurgical Corporation Site includes both source control and management of migration (or ground water control) components to obtain a comprehensive remedy.

The source control remedial measures include:

- * The removal of a septic tank and contents. These materials will be transported to an off-site incinerator for thermal destruction.
- * Excavation of approximately 250 cubic yards of contaminated leaching field soils. The excavation will remove all soils that fail to meet the cleanup standards for volatile organic compounds and metals. The excavated soils will be dewatered, placed into containers, and transported to an off-site,

licensed RCRA subtitle C facility for treatment and disposal. Attaining the soil target cleanup levels will eliminate the potential migration of contaminants from the soils into the ground water at levels exceeding ground water cleanup goals.

- * Excavation and off-site disposal of the materials in the two waste piles. This portion of the remedy provides for the excavation, treatment, and disposal of two waste piles. The excavated materials will be placed into containers. If the materials contain hazardous substances above cleanup levels, they will be sent to a RCRA subtitle C hazardous waste facility for treatment and disposal. Other waste pile materials will be sent to a solid waste facility or otherwise disposed of in a manner that will comply with all applicable federal, state, and local laws.

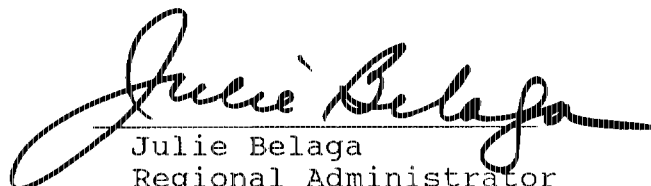
The management of migration remedial measures include:

- * Active restoration of the ground water aquifer contaminated with volatile organic compounds (VOCs) using air stripping of ground water and carbon columns for air emission control. This component of the remedy will extract and treat ground water contaminated by the Site. The goal of this remedial action is to restore the ground water to drinking water quality. Effluent from the treatment plant will be discharged to the Publicly Owned Treatment Works operated by the Conway Village Fire District.
- * Ground water will be extracted by use of either a collection trench or a number of wells. Combinations of trenches and extraction wells may also be used. Ground water extraction would act to halt the migration of contaminants and, facilitate the removal of contaminants, but would not dewater the wetlands.
- * The extracted ground water will first pass through a clarifier which will precipitate any metals contained within the ground water that either pose a risk to human health or the environment, or would reduce the effectiveness of the air stripping unit. Periodically the residue in the clarifier will be tested, removed, and disposed of at a licensed facility which is in compliance with appropriate laws and regulations. Ground water will then pass from the clarifier to the air stripping unit for removal of VOCs. The VOCs that are removed from the ground water will be captured prior to exhausting air to the atmosphere by carbon filters. These carbon filters will periodically be removed and either properly disposed of, or will be regenerated at an off-site facility. The remedy is expected to reach target cleanup levels in all locations in the aquifer in 10 years.
- * Additional measures include long-term environmental monitoring throughout the implementation of the remedy to ensure its effectiveness.

DECLARATION

The selected remedy is protective of the human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that utilize treatment as a principle element to reduce the toxicity, mobility, or volume of hazardous substances. In addition, this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

9/28/90
Date


Julie Belaga
Regional Administrator
U.S. EPA, Region I

RECORD OF DECISION
KEARSARGE METALLURGICAL CORPORATION

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SEPTEMBER 28, 1990

I. SITE NAME, LOCATION, AND DESCRIPTION

A. General Description

The Kearsarge Metallurgical Corporation (KMC) Site is located in Carroll County, Conway, New Hampshire. The KMC Site is on Mill Street, approximately one-half mile from the intersection of New Hampshire Route 16 and West Main Street in Conway, New Hampshire. A locus map showing the general location of the Site is included in Appendix A as Figure 1.

The Site is comprised of two lots, lots 7 and 8, as depicted on Map 27 at the Conway Tax Assessor's Office in Conway, New Hampshire. Lot 7 covers five acres and consists of forested wetland. The current owner of lot 7 is Carroll Reed, Inc. through a land trust. The only structures on lot 7 are a north-south oriented drainage pipe with four open-bottomed catch basins and the larger of two separate waste piles. Lot 8 consists of approximately four acres and contains the two buildings which belong to KMC, the septic tank and leaching field, the smaller of the two waste piles, and a small portion of the larger waste pile. No underground storage tanks are present at the Site. A Site map displaying boundaries, lot lines within the Site, and significant physical features is included in Appendix A as Figure 2.

The Site is bounded by Pequawket Pond to the south, by lots owned by New England Embroidery on the west, Conway Supply Company on the east, Mill Street and Carroll Industries on the northwest, and by another lot owned by Carroll Reed, Inc. on the North.

The Site is level and varies from four to six feet above the base level of Pequawket Pond. The Pond level is not static as the Pond is controlled at a dam further downstream. The entire Site and portions of adjacent property are within the 100-year floodplain. Forested wetlands cover much of the eastern portion of the Site, while the western boundary of the Site is fringed by shrub-scrub wetlands. No endangered or threatened flora or fauna were found to exist on, or in the vicinity of the Site. Also, no sensitive wildlife habitat was discovered. A map delineating the extent of on-site and nearby wetlands is included in Appendix A as Figure 3.

Recreational uses near the Site include swimming, boating, and fishing in Pequawket Pond. Pequawket Pond is not used as a drinking water source. Drinking water in the area is supplied by two wells that are 3,000 feet north of the Site and are shown in Appendix A on Figure 1 labeled "pumping station". These wells draw water from a 90' thickness of saturated sand and gravel. The Site exists in an area consisting of, and zoned for, commercial activities such as light manufacturing; however, residential areas

exist 600 feet to the north of the Site. Residential areas also are 300 feet to the south of the Site on the other side of Pequawket Pond. Densely populated residential areas are within one-half mile of the Site. The population of Conway is 8,800 and increases by as much as 86% on a seasonal basis.

Additional information regarding the characteristics of Conway, New Hampshire may be found in Section 2.4 of the Remedial Investigation (RI) conducted by the State of New Hampshire's contractor; Camp, Dresser, & McKee (CDM). Site characteristics, analytical results, and remedial alternatives have been presented in the following documents CDM has produced for EPA under a cooperative agreement with the State of New Hampshire:

Remedial Investigation Report, Kearsarge Metallurgical Corporation Hazardous Waste Site, Conway, New Hampshire. June 1990.

Feasibility Study Report, Kearsarge Metallurgical Corporation Hazardous Waste Site, Conway, New Hampshire. June 1990.

B. Geology and Hydrogeology of the Site

The Site lies in a broad region termed the Saco River Valley subdivision. The confluence of the Saco and Swift rivers lies one mile down stream from the Site. Pequawket Brook, which widens to become Pequawket Pond, flows northward and empties into the Saco river.

Much of the area consists of metasedimentary and igneous rocks overlain by a veneer of unconsolidated glacially derived sediments. These sediments consist of ice deposits such as glacial tills, glacio-fluvial deposits such as kame, and fluvial deposits that were subsequent to glaciation such as alluvium.

The two buildings on the Site rest on five to fifteen feet of fill. This fill consists of medium to fine sand. The fill areas underly and surround the immediate vicinity of the buildings. The upper one to two feet of this fill contain large amounts of sawdust interspersed with the sand and gravel, as the area served as a sawmill prior to 1964. Unfilled areas have soils consisting of principally a thin layer of hydric (wetlands) soils and some areas of a fine sandy loam. The water table at the Site is a variable boundary that fluctuates with both the seasons and the management of the level of Pequawket Pond. The depth to ground water may vary from two to six feet below the ground surface. Underlying the Site are a collection of unconsolidated alluvial and glacial deposits that mantle a buried glacial valley. These sediments vary from ninety to one hundred forty feet in depth and can be separated into three distinct layers on the basis of composition, structure, and hydraulic behavior. The three layers are termed, in order of descending depth, the fine silty sand layer, the stratified silty

sand layer, and the glacial till layer. A cross-section displaying the position and thickness of each of these units in relation to Site features is depicted in Appendix A as Figures 4a and 4b. The surficial geology of the area is depicted in Appendix A as Figure 5.

The uppermost layer (the fine silty sand layer) is comprised of ten to twenty feet of a homogeneous silty fine sand. Travel times of groundwater in this unit are approximately fifty feet per year in both the vertical and horizontal planes. Ground water flow in the fine silty sand layer is radial due to the influence of the large waste pile. The bulk of the contamination is found in the fine silty sand layer. The ground water flow contours for this upper contaminated unit are depicted in Appendix A as Figure 6.

Ten to twenty feet below the surface is a layer of silt stratified with clay and fine sand (the stratified silty sand layer). This layer is identical in composition to the overlying silty sand layer but is stratified or layered, imparting different hydraulic characteristics. The stratified silty sand layer is approximately seventy feet in thickness and underlies the Site completely. Ground water flow in this unit is to the north. Horizontal travel times of the ground water in this stratified silty sand unit are on the same order of magnitude as the overlying fine silty sand layer. The vertical travel times for the stratified silty sand layer are lower than the fine silty sand layer due to the stratification present. The vertical travel times are approximately two feet per year in the area of the large waste pile and diminish rapidly to zero feet per year with increasing distance from the waste pile.

The deepest layer of unconsolidated sediments is a layer of glacial till. This till is comprised of gravelly silty sand which has ground water travel times that are slightly faster than the overlying units (the fine silty sand and the stratified silty sand) and flow to the north. This unit varies from ten to thirty feet in thickness over the Site.

Bedrock underlying the unconsolidated units is the Conway Granite. The Conway Granite is relatively unfractured in the area of the Site and slopes gently downward to the northeast. Fracture trace analysis performed as a part of this study identified a set of fractures that roughly trend north-south and east-west; however, seismic refraction studies in the area of investigation display consistent and very fast velocities (16,000 to 17,000 feet per second) which indicates that the bedrock underlying the site is relatively unfractured and therefore would not serve as a likely conduit for migration of contamination.

C. Ground Water Supply

The two public drinking water supply wells operated by the Conway

Village Fire District, for the town of Conway, are approximately 3,000 feet to the north of the Site. Although the Site rests upon the same aquifer that the public drinking water supply wells use, the Site is currently outside the zone that contributes groundwater to those wells. The Site is within the zone that contributes ground water to the municipal wells if a low recharge year occurs and the wells are pumped at twice their present rate. A low recharge year is one which has 36 inches, or less, of precipitation. Average annual precipitation is approximately 40 inches per year. The present pumping rate for the Conway wells is 440 gallons per minute and future pumping conditions (2010) are projected to be 1,225 gallons per minute. This demonstrates that under current conditions, it is unlikely that any of the contaminants in the ground water at the Site will affect the public water supply wells; however, a threat may be posed to the public wells under future conditions. No private wells exist within a one half mile radius of the Site.

A more complete description of the Site can be found in the Remedial Investigation Report on Pages 2-1, 2-2 and 2-11 through 2-24.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Response History

The Site and many of the surrounding properties were operated by the Kennett Company as a saw mill from 1900 until 1964. During the period 1964 through 1982 the area of the present day Site was operated as a foundry by KMC. This foundry produced precision stainless steel castings. The castings were produced by the injection of molten steel into ceramic molds, otherwise known as the investment, or lost wax method. KMC used 1,1,1 Trichloroethane (TCA) as a solvent in the wax pattern process.

Wastes generated at the Site included solid wastes such as spent ceramic materials, and metal grindings; and hazardous substances such as caustic soda, hydrofluoric acid, volatile organic compounds (VOCs), and flammable liquids. As a result of their industrial processes, KMC generated chemical wastes containing high concentrations of TCA, chromium, hydrochloric acid (HCl), nitric acid (HNO₃), hydrofluoric acid (HF), isopropyl alcohol, and sodium hydroxide (NaOH). The disposal of hazardous and non-hazardous substances occurred on the east side of building #1, specifically the septic system and the waste pile. The septic tank discharged to the ground via a lower leach field and an upper PVC drainage pipe. The septic tank and lower leach field are located chiefly on the KMC side of the line separating lots 7 and 8, while the PVC drainage pipe was routed from the septic tank on lot 8 to a discharge point on the Carroll Reed side (lot 7). The PVC drainage pipe was buried one foot deep and surfaced at its discharge point on lot 7, Carroll Reed's property. The former position of the PVC

drainage pipe and the present position of the leach field are depicted in Appendix A, Figures 7 and 8 respectively. The application of an unknown amount of caustic soda, hydrofluoric acid, chlorinated solvents, and flammable liquids to both the ground surface and the septic system occurred in the late 1970's. The waste piles, which are located on both the Carroll Reed and KMC properties, originated prior to 1970, based on aerial photographs of the Site.

In 1979 the New Hampshire Water Supply and Pollution Control Commission notified James Eldredge, President of KMC, that the discharge of wastes to the septic system was not permitted. The response of KMC was to containerize and store its wastes in and near building #2. Approximately 17,800 gallons of acid, 54,000 pounds of caustic solids, and 660 gallons of flammable solvents were accumulated during the period that KMC drummed liquid wastes generated on-site. KMC was verbally ordered by the EPA and the New Hampshire Bureau of Solid Waste Management (NHBSWM) to recontainerize corroded drums in September 1981. KMC took no action to address these concerns, and in December 1981 a Letter of Deficiency was issued to KMC by NHBSWM. KMC ceased operations shortly after the issuance of the Letter of Deficiency. Indian Head Bank took possession of the property on lot 8 pursuant to its security agreements for a short period in 1982. The containerized wastes were removed from the Site in response to a verbal order by the U.S. Environmental Protection Agency (EPA) and the New Hampshire Bureau of Solid Waste Management (NHBSWM) in June of 1982.

The New Hampshire Bureau of Hazardous Waste Management (NHBHWM) issued a Notice of Violation and Order of Abatement to KMC and its former executives to conduct a hydrologic study of the Site in October 1982. KMC took no action to conduct such a study, and the State began a hydrologic investigation to characterize the Site. In December of 1982 monitoring wells, installed by NHBHWM and the New Hampshire Highway Department, showed significant levels of chlorinated solvents also known as Volatile Organic Compounds (VOCs) in the ground water. In May 1983 NHBSWM ordered KMC and its officers to remove the waste piles at the Site; however, no action was carried out by KMC to remove the piles. Further investigations resulted in a Hazard Ranking Score (HRS) of 40.73, resulting in the Site being added in September 1984 to the National Priorities List (NPL) of sites to be cleaned up. No remedial measures have been conducted at the Site. The Site has remained unoccupied since its abandonment in 1982.

The Remedial Investigation (RI) began in 1985 following the July 1985 Consent Order of New Hampshire v. KMC. KMC and its insurance carriers were ordered by the Court to conduct the RI with State oversight. Geotechnical Engineers Inc. (GEI) of Concord, New Hampshire were retained by KMC to conduct the investigation at the Site. GEI performed Site investigations and produced the following

documents:

Draft Phase I Site Characterization, Remedial Investigation/Feasibility Study, Kearsarge Metallurgical Corporation and Portions of the Carroll Reed Property Conway, New Hampshire. 1985.

Draft Remedial Investigation Report, Kearsarge Metallurgical Corporation Conway, New Hampshire. Volumes I, II, & III. December 5, 1986.

Draft Endangerment Assessment, Kearsarge Metallurgical Corporation Site-Conway, New Hampshire. March 25, 1987.

Draft Partial Feasibility Study Identification of Technologies and Initial Screening of Remedial Alternatives, Kearsarge Metallurgical Corporation Site Conway, New Hampshire. April 9, 1987.

Upon completion of these draft documents the insurance carriers for KMC discontinued funding of the investigation efforts. Following the review of these draft documents the EPA and the New Hampshire Department of Environmental Services (NHDES) determined that additional efforts would be required to complete the Remedial Investigation (RI) and the Feasibility Study (FS) in accordance with guidelines established under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Through a cooperative agreement reached in Autumn of 1988 between the EPA and NHDES, Superfund monies were made available for the completion of the RI/FS by the NHDES Waste Management Division. The firm of Camp, Dresser, and McKee was selected to be the contractor to complete the RI and the FS. In June of 1990 the RI and FS were released to the public along with EPA's proposed plan for the remedial actions at the Site. An Action Memorandum which provides for the removal of seven drums of uncharacterized materials from the Site by EPA was issued on September 25, 1990.

A more detailed description of the Site history can be found in the RI of CDM on pages 2-3 through 2-10.

B. Enforcement History

On June 20, 1990, EPA notified three (3) parties who either owned or operated the site of their potential liability with respect to the Site. Negotiations have not commenced with these potentially responsible parties (PRPs) regarding the settlement of the PRPs liability at the Site. One of the PRPs has commented on the proposed plan and submitted an additional alternative which is included in Appendix C.

III. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been moderate. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

During January of 1990 EPA released a community relations plan drafted by NHDES which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. Prior to that, on August 26, 1985 EPA held an informational meeting in Conway, New Hampshire, to describe the plans for the Remedial Investigation and Feasibility Study that was to be conducted by the private parties. The presentation of the findings of this study occurred on December 18, 1987 in Conway, New Hampshire. KMC discontinued funding for the RI/FS in 1988. It was determined at that time that additional work would be necessary to complete the RI/FS begun by KMC and its contractor GEI. On June 28, 1990 EPA held an informational meeting in Conway, New Hampshire to discuss the results of the RI/FS that was conducted under the direction of the State of New Hampshire.

On June 20, 1990 EPA made the administrative record available for public review at EPA's offices in Boston and at the Conway Public Library in Conway, New Hampshire. EPA published a notice and brief analysis of the Proposed Plan in the Conway Daily Sun on June 22, 1990 and made the plan available to the public at the Conway Public Library in Conway New Hampshire. EPA mailed copies of the proposed plan to state and local officials, citizens on the mailing list, the PRPs, and other interested parties. On June 28, 1990 EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From June 29, 1990 to July 28, 1990 the Agency held a thirty (30) day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. The public comment period was extended an additional thirty (30) days to August 27, 1990 at the request of a PRP. On July 24, 1990, the Agency held a public meeting to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the attached responsiveness summary. Also included in the responsiveness summary are the comments by a PRP. The responsiveness summary is included as Appendix C.

IV. SCOPE AND ROLE OF THE RESPONSE ACTIONS

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. In

summary, the remedy provides for the removal, treatment and disposal of the components of the two waste piles which are contaminated with hazardous substances that are above the cleanup levels, the septic tank with its contents, and the leaching field. Additionally, the remaining material of the waste piles will be taken off-site for landfilling at a RCRA subtitle D facility to minimize risks to human health. These actions constitute source control and will minimize the addition of contaminants to the groundwater beneath the Site and eliminate the potential for exposure to contaminants in these media. The selected management of migration remedy also provides for the extraction and treatment of contaminated groundwater. The actions taken under management of migration will minimize the discharge of contaminants into the surface water bodies, and control the migration of the contaminated ground water plume.

This remedial action will address the following principal threats to human health and the environment posed by the site:

- Further contamination of ground water by source areas identified at the Site.
- Direct contact with contaminated soil and waste pile material.
- Inhalation and ingestion of waste pile material.
- The off-site migration of contaminants in ground water.

Remedial activities at the Site are comprehensive and designed to be a final remedy.

V. SUMMARY OF SITE CHARACTERISTICS

Chapter 1, Section 1.3, of the Feasibility Study contains an overview of the Remedial Investigation. Contamination at the Site is the result of the discharge of VOCs, caustic materials, and acids to the septic system, the ground surface, and the waste piles. The approximate location of the septic tank, leaching field, and the larger of the two waste piles are depicted in Appendix A as Figures 7 and 8.

Analysis of soil, ground water, sediment, surface water, and waste pile material from the Site and adjacent areas indicate that the environmental contamination at KMC includes soil contamination in the leach field, septic soils, ground water contamination, and actual and potential contamination in the waste piles.

The most prevalent contaminants identified in ground water and the septic system at the Site are VOCs such as 1,1,1 Trichloroethane (TCA) and degradation products of TCA such as 1,1 Dichloroethane (1,1 DCA); 1,2 Dichloroethane (1,2 DCA); 1,1 Dichloroethylene (1,1

DCE); and 1,2 Dichloroethylene (1,2 DCE). Also identified in the ground water are Trichloroethylene (TCE), Acetone, and chloroform. Contaminants found in the waste piles include acids, caustics, chromium, nickel, and minor amounts of VOCs.

In the analysis of each contaminated media, analytical values obtained from the CDM RI will be used. Data supplied in the GEI Draft RI will be used to supplement CDM data. The significant findings of the Remedial Investigation are summarized below.

A. Soil

In this context soils are defined as materials occurring above the low water table which, because the water table fluctuates between two to six feet below the surface, is assumed to be six feet below the ground surface. The soils consist of fill (silty sand) which has pockets of sawdust and silt. In some areas, notably the wetlands, there is a thin layer of organic material. These soils can best be described as mineral soils. This definition of soil excludes the materials within the waste piles and the leaching field soils since neither consists of natural materials. The soil has been investigated by soil-gas techniques, test pitting, soil borings, and split spoon samples during well installation.

In 1989 CDM found that VOC contaminant levels in soil were very low with no detection of any VOCs. Only toluene, acetone, and ethyl benzene were detected in minor amounts. Metal levels (EP-Toxicity Extract) were below detection limits or very low. Therefore, no contaminants of concern were selected for the Site soils. The lack of contamination of Site soils is believed to be due to a number of factors:

- sawdust is an integral material in the upper one to two feet of the fill, this layer may have trapped any VOCs holding them near the surface where they were volatilized into the atmosphere;
- the lower mineral soils lack organic carbon which will retain VOC and metal contamination; and
- the fluctuating levels in Peguawket Pond have both a physical and chemical flushing action that mobilizes and removes any contaminants.

The ultimate destination of any contaminants that may have been present in the soil is the ground water. Further characterization of the soil surrounding and beneath the septic tank will be necessary when the tank is removed. One soil sample was taken adjacent to the septic tank and found to have TCA (53 ppb) and 1,1 DCA (31 ppb). The location of soil samples obtained by CDM are in Appendix A as Figure 9.

B. Leaching Field Soils and Septic Tank

The leaching field consists of two levels, an older lower level and a newer upper level. It is believed that the lower level either stopped functioning or became limited in its performance and that the upper level was installed to empty the septic tank. The lower level is attached to the septic tank by an outlet pipe that extends twenty feet from the septic tank to the distribution box. The plastic leach field pipes radiate from the distribution box and are bedded on two to four inches of medium to coarse black foundry sands. These foundry sands are underlain by hay and one foot of gravel. The leach field pipes are buried 3 feet below the surface and are at, or just above, the water table for portions of the year and many of them were clogged with silt, organic matter, and lime-like material. This lime-like material is believed to be caustic that was either disposed of into the system, or was added to restore the performance of the septic system. This lower leach field is situated chiefly on lot 8 between the building and the larger waste pile. The upper leach field consists of a single PVC drainage pipe that rests above the lower leaching field, and is buried one foot below the surface. This PVC pipe extended eastward from the septic tank to discharge into the wetland on Lot 7 at a point fifty feet from the boundary of KMC (lot 8) and Carroll Reed (lot 7). Much of the area over the leach field has been disturbed by test pitting operations.

The leach field soils occupy an area of approximately 20 feet by 55 feet principally on lot 8 and includes a small area where the PVC drainage pipe discharged on lot 7. The areas considered to be leaching field soils are depicted in Appendix A as Figure 10. No samples were obtained in the subsurface leachfield; however, it is believed that the organic material present in and around the leaching pipes may have retained some of the contaminants. Samples taken near the PVC drainage pipe in 1985 had levels of TCA (140 ppb) and small quantities of other volatiles. Samples taken near that same pipe in 1989 had minor amounts of acetone and no detectable VOCs. Also, ground water near the area of the PVC drainage pipe (well MWS-101, Appendix A Figure 2) has historically been the most contaminated of all the wells until the 1989 sampling rounds conducted by CDM. The septic tank and leach field received wastes from pipes extending from the penetrant room and the degreasers which contained TCA (see Appendix A, Figure 8).

The material in the septic tank is an indication of the contamination of the leach field soils. The septic tank is located on the eastern side of building #1. It was constructed prior to 1975, and used as an industrial disposal system. An aqueous sample obtained from the septic tank in July, 1989 contained greater than 3,300 ppb of TCA and 1,200 ppb of 1,1 DCA. Sediments within the septic tank also contained values of TCA and 1,1 DCA, 3,300 ppb and 3,800 ppb respectively. Metal content within the sediments of the septic tank contained chromium (18 ppm). Aqueous samples of the

septic tank yielded values of total chromium (2.6 ppm). Based on the investigation results it appears that wastes were discharged to the septic system and that the migration of VOCs from the septic tank to the leach field has contributed to the presence of contaminants in ground water at the Site.

C. Waste Piles

Two waste piles are located on the Site. The larger pile, containing approximately 4,250 cubic yards of material, is located on the eastern side of Building #1. The smaller pile, which contains approximately 400 cubic yards of material, is located on the eastern side of Building #2. The locations of the waste piles are depicted in Appendix A Figure 2.

During waste pile excavation an airborne hazard was identified. Materials within the piles were sieved and found to contain 40% by volume of particles that could be entrained by the wind. The primary concern is that the fine, particulate materials in the waste piles may be entrained by the wind during waste pile excavation or during some episode in which the piles were stripped of their vegetation. This particulate matter is composed of fine silica sands, chromium, and nickel. Particulate nickel and chromium have been identified as carcinogenic when inhaled. Total metals identified to be above background include chromium (400 ppb) and nickel (200 ppb). These metals pose no threat to ground water as EP-Toxicity extracts of the waste pile material yielded results below the detection limits. Fine silica particles entrained by the wind also pose a human health threat via inhalation (silicosis).

Toluene, acetone, chloroform, ethylbenzene, and methylene chloride were detected at low levels in the waste pile material in sampling rounds in 1989. No other VOCs were detected within the waste pile samples during the 1989 sampling round. It may be noted however, that detection limits for the 1989 sampling of the waste pile by CDM were up to 1700 ppb (1.7 ppm) for TCA. Therefore it is possible that relatively high values of TCA, which exceed cleanup levels, still remain in the waste piles. Cleanup levels will be discussed further in this document.

Test pit exploration determined that the waste piles contain an unspecified amount of drummed wastes that may include caustics, isopropyl alcohol, and organic solvents. During the test pit program conducted by GEI many drums were discovered within the waste pile. The location and number of discovered drums is shown in Appendix A as Figure 11.

D. Ground water

Ground water at the Site has been sampled periodically since 1982. Contamination during that time has consisted of TCA; 1,1 DCA; 1,2 DCA; 1,1 DCE; 1,2 DCE; TCE; chromium and nickel. TCA is the

primary contaminant at the Site. DCA and DCE (1,1 and 1,2) are the decay products of TCA. Values of TCA ranged between 0.95 and 18,500.0 ppb in the ground water for the February 1990 sampling round. These levels have varied greatly over the sampling history of the Site. The most contaminated wells have been MW-7 (3,500 to 135,000 ppb of TCA) and MWS-101 (1,008 to 19,000 ppb of TCA) during sampling rounds from 1982 to the present. The following analytical results were obtained for TCA, DCA and DCE at the Site during the conduct of the RI by CDM:

TABLE I

<u>CONTAMINANT</u>	<u>MAY 1989</u>	<u>FREQ.</u>	<u>FEB 1990</u>	<u>FREQ.</u>
	ppb		ppb	
1,1,1 Trichloroethane	5,680.00	12/24	18,500.00	7/10
1,1 Dichloroethane	1560.00	9/24	794.00	4/10
1,2 Dichloroethane	2.00	1/24	14.60	1/10
1,1 Dichloroethylene	2.78	1/24	615.00	4/10
1,2 Dichloroethylene	38.40	1/24	14.50	1/10
Trichloroethylene	3.48	1/24	118.41	2/10
Acetone	374.00	1/24	0.00	0/10
Chloroform	171.00	3/24	0.00	0/10
	ppm			
Chromium	0.01	1/21	not analyzed	
Nickel	4.70	3/21	not analyzed	

This table lists only the maximum value of contamination found in the monitoring wells. The frequency is the number of times that the contaminant was found to exist over the detection limits for wells at the Site. The February 1990 sampling round concentrated on seven wells that are the most heavily contaminated and includes three new wells that were installed earlier in February 1990.

The contaminated ground water plume containing TCA, along with the other contaminants, has been migrating away from the Site in a radial pattern from the septic area and waste pile. The sources of this plume are the leach field on the property of KMC (lot 8) and the PVC drainage pipe that discharged to the property of Carroll Reed (lot 7). The portion of the plume that has levels that exceeds the Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act (SDWA) occupies the area to the east of Building #1. The size of this area is approximately 400 feet in length by 400 feet in width and 20 feet in depth. This plume underlies lot 7. The location of the contaminant plume is depicted in Appendix A Figure 12. The estimated volume of ground water within this plume is roughly five million gallons. The volume of contaminants adsorbed to the soil and sediments of the fine silty sand layer is minimal because there is little organic carbon below the ground surface. A TCA partition coefficient experiment was conducted during the RI that found that very low levels of the TCA were adsorbed onto the soil.

The contaminated ground water is concentrated in the upper twenty feet of the alluvium (the fine silty sand layer). Migration is restricted by slow travel times and an underlying low permeability layer in the alluvium (the stratified silty sand layer). The flow of contaminants has not appeared east of the drainage culvert on lot 7. The failure of contaminants to migrate further east of the culvert has been interpreted as being due to ground water discharging to the culvert where the VOCs either evaporate or are diluted by inflow from the Pond. The possibility exists, with the passage of time, for the downward spread of contamination from the upper twenty feet through the stratified silty layer and ultimately to the till and bedrock units.

TCE is present in significant quantities in only one well and has been confined to that well (MW-11) with minor exceptions. TCE appears to exist as a separate plume with a separate source and has not migrated since it was detected in 1983.

Significant attenuation of contamination has not been observed in groundwater at the Site. Although TCA does degrade, it does so slowly and in conjunction with specific mechanisms which appear to be insufficient in the aquifer underlying the site. The primary degradation and attenuation pathways are dilution/dispersion, volatilization to the atmosphere, and biodegradation. Dilution and dispersion have a minimal impact on the contaminants as ground water flow is very slow. The rate of contaminant flow is less than the ground water flow (50 feet per year); however, it is difficult to quantify. Volatilization has not impacted contaminant levels at the Site due to cold ground water temperatures. Biodegradation has also not functioned to reduce contaminant levels as the nutrients and environment required for microbial growth do not extend into the fine silty sand aquifer from the surface. Some biodegradation does occur at the Site albeit at low quantities and slow rates. TCA is degrading slowly to less desired, and more toxic contaminants such as 1,1 DCE; 1,2 DCA; and vinyl chloride. An examination of TCA levels over the period 1982 through the present show no distinct or significant trend of biodegradation or attenuation. An examination of Appendix B, Table 1 demonstrates that contaminant levels are not only increasing, but are also appearing in wells that were previously uncontaminated. A further discussion of contaminant fate is contained in Section 5 of the RI.

E. Surface Water

Surface water at the Site encompasses those waters in Pequawket Pond and the catch basins for the drainage culvert to the east of the Site (lot 7). All surface water samples were analyzed for VOCs and the following metals: copper, chromium, mercury, nickel, and zinc. In all surface water samples taken in 1989, no VOCs were detected. However, some elevated levels have been detected in the catch basins on lot 7 in 1983 and 1984. These levels are most likely due to the influx of ground water into the drainage culvert.

Two metal species, chromium and Nickel were detected at low quantities (0.05 and 0.15 ppm respectively) in Pequawket Pond. It may be further noted that these are the maximum levels obtained and that the majority of samples were below detection limits. Based on the available data, it appears that any impacts of the KMC Site on the surface water of Pequawket Pond are not significant.

F. Sediments

Sediments sampled include those of Pequawket Pond and the catch basins of the drainage culvert on the eastern side of lot 7. Sediments associated with the septic tank will not be addressed in this section. All sediment samples were analyzed for acid/base neutral extractables (ABNs); VOCs; and the following metals; copper, chromium, mercury, nickel, and zinc. Elevated levels of mercury were detected in Pond sediments; however, no mercury has been detected in the septic system or the casting sands. Therefore the mercury does not appear to be associated with the Site.

While the volume of contaminated sediments underlying Pequawket Pond remains large, those sediments associated with the catch basins occupy a very small volume perhaps no greater than a cubic yard. The mobility of these sediments, both in the pond and the catch basins, is extremely limited. In these environments the sediments will likely be buried under newer sediments as time progresses.

G. Air

Air monitoring at the Site has included ambient air sampling with a photoionization detector, Draeger tubes specific to vinyl chloride, charcoal collection tubes for laboratory analysis, and air monitoring badges worn by on-site personnel and in stationary deployment around the Site. Ambient air analysis consistently showed no contamination above background levels. Vinyl chloride was detected on personal air monitoring badges on two separate days (7 & 8.4 ppm) when test pit operations on the Waste Pile were being conducted. Passive air monitoring badges were positioned in several locations across the site. These badges showed no detection of any VOCs. Similarly, charcoal tubes were deployed near several of the source areas and later analyzed at a laboratory. These also showed no detection. It is believed that the vinyl chloride that was detected during test pit operations was a limited occurrence and was most likely a degradation product of TCA.

H. Structures

Structures on the site consist of two buildings, a larger building to the south in which manufacturing operations took place (designated as Building #1), and a smaller building to the north which was used principally for storage. Both buildings are largely

empty of equipment and no wastes are apparent in either building. Several depressions in the floor are periodically filled with water that is contaminated; however, this water is invading ground water and not an additional source of contamination. The floor plan of building #1 is shown in Appendix A Figure 8.

A complete discussion of site characteristics can be found in the RI at Section 4, pages 4-1 through 4-23 and Section 5, pages 5-1 through 5-14.

VI. SUMMARY OF SITE RISKS

The State's contractor, CDM, performed an Endangerment Assessment (EA) to estimate the probability and magnitude of potential adverse human health effects from exposure to contaminants associated with the Site. The EA is in chapter six (6) of the Remedial Investigation Report. The human health risk assessment followed a four step process: 1) contaminant identification, which identified those hazardous substances which, given the specifics of the site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and 4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic, and noncarcinogenic risks at the Site. The results of the human health endangerment assessment for KMC are discussed below.

An ecological assessment, found in chapter seven (7) of the Remedial Investigation Report, provides a qualitative assessment of potential adverse environmental effects from exposure to contaminants at the Site. A summary of the conclusions from the ecological assessments follows the human health risk assessment.

Thirteen (13) contaminants of concern, listed in Tables 2 through 5 found in Appendix B of this Record of Decision, were selected for evaluation of potential human health effects from exposure to ground water, waste piles, surface water and sediments in the EA. These contaminants constitute a representative subset of all the contaminants identified at the Site during the Remedial Investigation. Contaminants of concern were selected to represent potential site related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in section 6.1.3 of the Endangerment Assessment.

An assessment of potential adverse effects to the ground water from contaminants leaching from the septic system was also conducted.

The septic system includes the septic tank and the leachfield soils. Four volatile organic compounds were found in the leachfield soils during the 1985 investigation. The chemicals identified include; Tetrachloroethylene, 1,1,1-Trichloroethane, Methylene Chloride, and 1,1-Dichloroethane. For this scenario 1,1,1-Trichloroethane was used as an indicator chemical to establish an allowable concentration of VOCs in soil to protect the ground water. Cleanup levels are explained in more detail in Section X of this document.

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The scenarios developed are considered to be a reasonable worst case estimate. The following is a brief summary of the exposure pathways evaluated. A more thorough description of exposure pathways can be found in section 6.3 of the EA which is in Chapter 6 of the RI.

Ground Water

The ground water is not currently being used. Therefore no current exposure scenario was considered. Future use of ground water by residents, as a drinking water supply, was evaluated as a potential exposure pathway. The ground water underlying the Site has a classification of IIB, a potential drinking water source. For this scenario a lifetime of consuming two (2) liters of water per day was assumed.

Waste Piles

Ingestion of waste pile contaminants was evaluated for potential current and future exposures. The current scenario assumed trespassing by older children, seven (7) to eighteen (18) years old, 32 days per year for twelve (12) years. For the future scenario, residential use of the site was assumed. The exposure scenario evaluated a more sensitive population, children aged one (1) to six (6). It was assumed they might be exposed to the contaminants in the waste piles 100 days per year for six (6) years. No current exposure scenario was considered for the inhalation of particulate matter from the waste pile. Future exposure is contingent upon either man-made or natural disturbance of the waste piles natural cover. It is not possible to quantify risks associated with the inhalation of particulate matter in the future scenario; therefore, this risk will be discussed from a qualitative standpoint.

Surface Water

Incidental ingestion of one tenth of a liter of surface water while swimming was evaluated as a potential current and future exposure pathway. The current scenario assumed swimming in Pequawket Pond 16 days per summer for 70 years. The future scenario assumed residential use of the site and increased use of the pond to 64 days per summer.

Sediments

Ingestion of sediments was evaluated for potential current and future use. The current scenario assumed ingestion of sediments by older children seven (7) to eighteen (18) years old, 16 days per year for twelve (12) years. Residential use for the site was assumed for the future scenario and a more sensitive population, children aged one (1) to six (6), was evaluated. It was assumed young children might ingest 200 milligrams of sediment 64 days per year for six years.

Cancer risks are calculated by multiplying the toxicity and the exposure: $\text{Risk} = \text{Toxicity} \times \text{Exposure}$. The toxicity of carcinogenic compounds is expressed as a chemical specific cancer potency factor (CPF). The cancer potency factor is the potency per milligram of contaminant per kilogram of body weight per day. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is very unlikely to be greater than the risk predicted.

Exposure level refers to an individual uptake of contaminant based on site specific information and assumptions. The exposure level is expressed as milligrams of contaminant per kilogram of body weight per day. Risk for an individual contaminant is then calculated as follows: $\text{Risk} = \text{cancer potency factor} \times \text{Exposure}$. The resulting risk estimates are expressed in scientific notation as a probability (e.g. $1.0\text{E}-06$ or 10^{-6} for one in a million) and indicate (using this example) that an individual is unlikely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure to the compound at the stated concentration.

The hazard index (HI) was also calculated for each pathway as EPA's measure of the potential for noncarcinogenic health effects. The hazard index is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for noncarcinogenic health effects. Thus, exposure levels which are below the reference dose will yield a hazard index less than one. A hazard index less than one indicates that lifetime exposure to the contaminant is unlikely to produce an adverse health effect.

Reference doses have been developed by EPA to protect sensitive

individuals over the course of a lifetime. They reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. Reference doses are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur.

Tables 6 through 13, found in Appendix B of this Record of Decision, summarize the adverse human health effects for the exposure pathways identified above. Each table identifies the average and reasonable maximum exposure based on the average and maximum concentration of contaminants. Contaminants which produce carcinogenic effects were found only in ground water, therefore a risk estimate was calculated for drinking ground water.

Contaminants that produce noncarcinogenic effects were evaluated for drinking ground water, and ingestion of waste piles, surface water, and sediments. Adverse effects from dermal contact were not quantified since the contaminants identified in these media are not known to be absorbed through the skin.

The current potential risks from the ground water at this site exceed EPA's established risk range of one in ten thousand (10^{-4}) to one in a million (10^{-6}) for carcinogenic contaminants and a hazard index greater than one (1) for contaminants with noncarcinogenic effects. For ground water the potential future risk estimates of excess lifetime cancer risk range from seven (7) cancer cases in 10,000 to 1.5 cancer cases in 100. The chemical 1,1-Dichloroethylene contributes approximately 70 percent of the risk. For the chemicals with noncarcinogenic effects the total hazard indices for ground water are equal to or greater than one (1) which indicates that the concentrations of contaminants could result in adverse effects.

Many contaminants of concern in ground water exceed drinking water regulations Maximum Contaminant Level (MCL) or Maximum Contaminant Level Goal (MCLG). The following is a list of contaminants of concern, their MCL or MCLG and the maximum value of that contaminant found to exist in the ground water at the Site in 1989:

TABLE II

<u>Contaminant</u>	<u>MCL\MCLG</u>	<u>MAXIMUM CONCENTRATION</u> (1989)
1,1,1 Trichloroethane	200 ppb	5,680.0 ppb
1,1 Dichloroethylene	7 ppb	615.0 ppb
1,2 Dichloroethane	5 ppb	14.6 ppb
Trichloroethylene	5 ppb	120.0 ppb

The contaminants in the waste piles, based on the potential future exposure scenario, results in a hazard index greater than one. The main contaminant found in the waste pile is chromium. Due to the lack of information on the speciation of chromium the risk

assessment assumed all the chromium detected is in the hexavalent ionic state. This assumption produces a result that is protective of human health. The hazard indices were less than one for ingestion of sediments and surface water for the future and current scenarios. Therefore, these two pathways are not considered as a threat to human health.

The inhalation of fine particulate material from the waste pile may present an imminent and substantial endangerment to the public health in the future scenario. If the waste pile is exposed by either natural or man-made events, the possibility exists that a significant amount of the waste pile material could be entrained by the wind (up to 40%). This material contains fine silica, and particulate chromium and nickel. Chromium (hexavalent ionic state) and nickel are carcinogenic by the inhalation route. Fine-grained silica, when inhaled, leads to silicosis.

A qualitative study of the ecological effects of the Site was conducted. It found that ingestion of contaminants at the site by the biological community (as described in section 7.1 of the RI) does not appear to pose a major risk. The major risk posed is from potential destruction of the waste piles since they are within the 100 year flood plain and encroach on the wetlands. Erosion of this waste pile during major flooding events could pose a potentially significant risk to the Pequawket Pond system and the wetlands.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, and the environment. Specifically an imminent and substantial threat to public health and the ecosystem could result from the waste pile and potential threat to human health could occur from drinking ground water.

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over

remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. These response objectives were:

1. To minimize further horizontal and vertical migration of contaminated ground water from the KMC Site;
2. To minimize any negative impact to Pequawket Pond resulting from discharge of contaminated ground water;
3. To prevent the inhalation of wind blown fine, particulate materials from the Waste Piles;
4. To reduce the risks associated with ingestion of or physical contact with metals in the Waste Piles;
5. To prevent the possibility of a release of other contaminants that may be present in the Waste Piles;
6. To prevent the migration of contaminants from the septic system and surrounding soils that could further degrade ground water quality, and;
7. To reduce the risk associated with inhalation of VOCs and physical contact with the contents of the septic system or the surrounding soils.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for the site.

With respect to source control, the Feasibility Study (FS) developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent practicable, eliminating or minimizing the need for long term management. This range also included alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternatives that involve little or no treatment but provide protection through engineering or institutional controls; and a no

action alternative.

With respect to ground water response action, the FS developed a limited number of remedial alternatives that attain site specific remediation levels within different time frames using different technologies; and a no action alternative.

Chapter 3 of the FS identified, assessed, and screened technologies based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MM) alternatives. Chapter 3 of the FS presented remedial alternatives that were developed by combining the technologies identified in the previous screening process, into the categories identified in Section 300.430(e) (3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated and screened in Chapter 4 of the FS.

In summary, of the 13 source control and 8 management of migration remedial alternatives screened in Chapter 3 of the FS, five source control and six management of migration alternatives were retained for detailed analysis. Tables 3-5 and 3-6 of the FS identify the alternatives that were retained through the screening process, as well as those that were eliminated from further consideration.

VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated. A detailed tabular assessment of each alternative can be found in Tables 3-3 of Section 3 and 4-10 of Section 4 of the FS.

A. Source Control (SC) Alternatives Analyzed

Source control alternatives are concerned with the elimination of those areas in which large concentrations of contaminants exist that were formerly disposal areas. These areas may still contribute to the spread of, or intensification of, contamination to the sediments, ground water, or surface water at and off the Site. The principle source area, and prime threat, that has been identified is the septic tank with its leach field. The waste piles are considered to be potential source areas since their contents are not fully characterized and disposal practices in the past may have resulted in hazardous substances being placed there. Also, the waste piles are considered to be a potential inhalation hazard. If a drum within the waste pile containing a hazardous substance were to discharge its contents, or if the waste piles were to be disturbed such that they became subject to wind erosion, the waste piles would be considered a prime threat.

The source control alternatives analyzed for the Site include the

following alternatives:

- SC-1: No-action Alternative;
- SC-3: Off-Site Solid Waste Landfill and On-Site Low Temperature Thermal Stripping;
- SC-5: Off-Site Solid Waste Landfill and Off-Site Incineration;
- SC-6: Off-Site Solid Waste Landfill and Off-Site Hazardous Waste Landfill; and
- SC-13: Off-Site Hazardous Waste Landfill.

SC-1
No-Action

This alternative is included in the Feasibility Study (FS), as required by CERCLA, to serve as a basis for comparison with the other source control alternatives being considered.

This source control alternative would involve no remedial action on the contaminated soil associated with the leaching field, the septic tank, or the waste piles. Further, the hazard of a drum containing a hazardous substance within the waste pile discharging its contents will remain unmitigated.

This alternative does not meet any identified ARARs, particularly since MCLs are already exceeded at the Site. Leaving the waste pile intact may lead to violations of the Clean Water Act (CWA) if a buried drum were to rupture, and violations of EO 11990 (Protection of Wetlands) if the waste pile were to erode and fill portions of the wetlands. Disturbing the waste pile in a search for drums, and then placing the nonhazardous components of the waste piles on-site may lead to violations of the Clean Air Act (CAA), EO 11988 (Floodplain Protection), EO 11990, and will lead to violations of New Hampshire Solid Waste Rules.

SC-3
Off-Site Solid Waste Landfill and On-Site Low Temperature Thermal Stripping

This alternative involves excavation of the waste piles and on-site treatment of the leach field soils. EPA estimates that the portion of the waste piles contaminated with hazardous substances above cleanup levels will make up approximately five percent of the waste piles. This estimate is based on test pitting, data collected by GEI, and soil borings conducted within the waste pile. The larger waste pile, which is behind building #1, contains an estimated volume of 4,250 cubic yards (including two feet of underlying soil). The smaller waste pile, which is directly north

of the larger waste pile and behind building #2, contains an estimated 400 cubic yards (including two feet of underlying soil).

The remaining 4,400 cubic yards of fine particulate materials in the waste piles will be taken off-site to a RCRA subtitle D solid waste facility or will be disposed of in an appropriate manner that will comply with all federal, state, and local laws. Removal of the waste piles will be conducted so as to minimize dust production. This action will reduce the potential hazard of the inhalation of carcinogenic and toxic, noncarcinogenic particulate matter. Removing the waste piles will also ensure compliance with wetland and floodplain ARARs, and the New Hampshire Solid Waste regulations.

The materials in the waste piles containing hazardous substances above cleanup levels, which are estimated at 250 cubic yards, will be excavated, transported, and treated prior to landfilling in a RCRA subtitle C hazardous waste landfill. Treatment methods in all of the alternatives cited in which there is off-site landfilling at a RCRA Subtitle C hazardous waste landfill (SC-3, SC-5, SC-6, and SC-13) will be dependent on which RCRA Subtitle C hazardous waste landfill is in compliance and accepting wastes when the remedy begins.

Contaminated leach field soils will be treated on-site with low temperature thermal aeration for this alternative. The contaminated leaching field soils are believed to occupy a volume of 250 cubic yards. It is assumed that it will be necessary to excavate the area of the leach field (125 square yards) down to the water table or a depth of 6 feet. The leaching field excavation will be preceded by an exploratory boring program to fully characterize the volume and nature of contaminants to be removed. Excavation and removal of contaminated leach field soils will be based on the cleanup levels contained in Section X of this document. The results of several pilot studies have demonstrated that VOC removal efficiencies of 99.99% are possible with low temperature thermal aeration. The treated soil will be disposed of on-site in the same area from which it was excavated.

The septic tank and its contents (a total of 5 cubic yards) will be excavated and transported off-site for incineration. The residue will be disposed of at a RCRA Subtitle C Hazardous Waste Facility.

Applicable or Relevant and Appropriate Requirements (ARARs) for the removal, transport, and incineration of the septic tank include the CWA, the CAA, portions of the Resource Conservation and Recovery Act (RCRA), the Safe Drinking Water Act (SDWA), OSHA requirements, DOT rules for Hazardous Materials Transport, Executive Orders (EO) 11988 Floodplain Management, EO 11990 Protection of Wetlands, N.H. Hazardous Wastes Rules, N.H. Solid Waste Rules, and N.H. Drinking water and Ground Water protection

statutes. Land Disposal Restrictions (LDRs) under 40 CFR 268 will apply to any containerized wastes that are discovered during the waste pile excavation if those wastes are either labeled as RCRA listed hazardous wastes, or if they have properties of characteristic wastes. Any materials found during the excavation of the waste piles that are subject to the LDRs, will be containerized or overpacked and transported to the appropriate treatment and disposal facility.

ESTIMATED TIME FOR CONSTRUCTION: 1 month
 ESTIMATED TIME FOR OPERATION: 6 months
 ESTIMATED CAPITAL COST: \$3,301,000
 ESTIMATED O & M: (Included with Capital Costs)
 ESTIMATED TOTAL COST (Present worth): \$3,301,000

SC-5

Off-Site Solid Waste Landfill and Off-Site Incineration

This alternative provides the same method of treatment and disposal for the waste pile materials as SC-3.

Leaching field soils will be excavated as in SC-3, and transported to a facility to be incinerated. Destruction efficiencies for VOCs contained in soil and debris through incineration are very high (99.9999%). Residue from the incineration process may be treated and disposed of at a RCRA subtitle C Hazardous Waste facility.

The ARARs of concern are the same as in SC-3.

ESTIMATED TIME FOR CONSTRUCTION: 1 month
 ESTIMATED TIME FOR OPERATION: 6 months
 ESTIMATED CAPITAL COST: \$4,060,000
 ESTIMATED O & M: (Included with Capital Costs)
 ESTIMATED TOTAL COST (Present worth): \$4,060,000

SC-6

Off-Site Solid Waste Landfill and Off-Site Hazardous Waste Landfill

Waste pile material will be treated and disposed of in a fashion identical to SC-3 and SC-5.

Leaching field soils in this alternative will be excavated as in SC-3, transported off-site, treated, and disposed of in a RCRA subtitle C hazardous waste landfill.

The ARARs of concern are the same as in SC-3 and SC-5.

ESTIMATED TIME FOR CONSTRUCTION: 1 month
 ESTIMATED TIME FOR OPERATION: 6 months
 ESTIMATED CAPITAL COST: \$3,256,000
 ESTIMATED O & M: (Included with Capital Costs)
 ESTIMATED TOTAL COST (Present worth): \$3,256,000

SC-13**Off-Site Hazardous Waste Landfill**

This alternative would result in the removal of both waste piles in their entirety and the leach field soils for disposal at a RCRA subtitle C hazardous waste landfill. This alternative was formulated on the presumption that all of the waste pile material is unsuitable for disposal at a solid waste landfill.

The ARARs of concern are the same as in SC-3, SC-5, and SC-6.

ESTIMATED TIME FOR CONSTRUCTION: 1 month
 ESTIMATED TIME FOR OPERATION: 6 months
 ESTIMATED CAPITAL COST: \$4,566,000
 ESTIMATED O & M: (Included with Capital Costs)
 ESTIMATED TOTAL COST (Present worth): \$4,566,000

B. Management of Migration (MM) Alternatives Analyzed

Management of migration alternatives address contaminants that have migrated from the original source of contamination. At the Kearsarge Metallurgical Site, contaminants have migrated from the area of the leaching field and larger waste pile. Ground water flows to the east from the source area. Surface water flows to the south into adjacent Pequawket Pond and east into the adjoining wetlands. The prime threat is the contaminated ground water plume which is flowing to the east.

The Management of Migration alternatives evaluated for the Site include:

- MM-1: No Action;
- MM-2: Ground Water Monitoring Program;
- MM-3: Ground Water Extraction, On-Site Treatment, and On-Site Recharge;
- MM-4: Ground Water Extraction, On-Site Treatment, and Discharge to Surface Water;
- MM-5: Ground Water Extraction, On-Site Treatment, and Discharge to Publicly Owned Treatment Works (POTW); and
- MM-6: Ground Water Extraction, On-Site Treatment, and Discharge to POTW or On-Site Recharge;

MM-1**No-Action**

Under this alternative, no active measures would be taken to control or remediate the groundwater contamination at the Site.

Further, no monitoring of the contaminant plume would occur. Contaminant levels in the ground water at the Site exceed MCLs, and show no tendency to attenuate with time. Therefore, this alternative is neither practicable, nor protective of human health and the environment.

This alternative does not meet any identified ARARs, particularly since MCLs are already exceeded at the Site.

MM-2

Ground Water Monitoring Program

This alternative consists of long-term ground water sampling and analysis to monitor contaminant concentration and migration, and imposition of institutional controls such as deed restrictions to prevent the development of contaminated ground water for use as drinking water. Sampling would be performed twice a year for the first five years and annually for an additional 25 years. Under this alternative additional sampling beyond 30 years may be possible if contaminant levels persist.

This alternative does not meet any identified ARARs, particularly since MCLs are already exceeded at the Site.

ESTIMATED TIME FOR CONSTRUCTION: 1 to 2 years
ESTIMATED TIME FOR OPERATION: 30 years
ESTIMATED CAPITAL COST: \$85,000
ESTIMATED O & M (Present Worth): None
ESTIMATED TOTAL COST (Present worth): \$85,000

MM-3

Ground Water Extraction, On-Site Treatment, and On-Site Recharge

Alternatives MM-3, MM-4, MM-5, and MM-6 are identical in that they propose to extract the contaminated ground water and treat it. The primary difference is where the water is discharged. The ground water would be extracted from the shallow aquifer with either groups of wells or an extraction trench. The collected contaminated ground water would then be treated to remove metals by chemical precipitation. The precipitation process tentatively selected, the sulfide process, would remove iron and manganese which would reduce the efficiency of further treatment processes. Prior to full implementation of the management of migration remedy a pilot plant or treatability study would be performed to determine the proper metal precipitation process and the ability of the complete system to remove all contaminants of concern to the required levels. The sulfide process was selected because it removes chromium and nickel, which were the metals selected as contaminants of concern in the ground water. The solids that would be precipitated out of the ground water would be dewatered and shipped to a hazardous waste treatment and disposal facility if determined to be hazardous, or to an off-site solid waste landfill

if determined to be non-hazardous. Ground water would then be treated to remove VOCs, utilizing an air stripping treatment. In air stripping, the contaminated groundwater is pumped to the top of a tower where, as the water cascades down, air is forced up through the tower removing VOCs from the ground water and placing them into the air stream. The resulting air stream is then passed through an activated carbon filter to remove contaminants before being released to the atmosphere. Prior to discharge to the sewer, the ground water contaminants will be reduced to a level at or below cleanup levels as outlined in Section X of this document.

In this alternative (MM-3) ground water would be extracted and treated to cleanup levels. Once treatment is complete, ground water would be re-introduced to the watertable through an underground recharge bed. The on-site recharge would assist in flushing the contaminated ground water through to the extraction system. The increased time frame for cleanup, 10 to 15 years; as opposed to 10 years for alternatives MM-4, MM-5, and MM-6; is due to climate conditions at the Site. Freezing temperatures or seasonally high ground water levels may restrict the use of aquifer recharge as proposed in this alternative.

ARARs for this alternative, and each of the following alternatives, are the CWA, the SDWA, the CAA (for emissions from the stripper), Executive Orders 11988 (floodplains), 11990 (wetlands), and New Hampshire Wetland regulations. Ground water recharged to the aquifer must meet the cleanup levels established in this Record of Decision (ROD). Also, any discharge of treated ground water to ground water at the Site must meet the requirements of the New Hampshire ground water discharge limits in accordance with N.H. Code Ws 410, Protection of Ground Water.

Alternatives MM-3, MM-4, MM-5, and MM-6 are affected by EO 11990 and N.H. Wetland regulations because of the negative impact the construction of a ground water extraction system and ground water pumping may have on the wetlands. Compliance with these regulations will involve maintaining erosion and siltation controls during construction, and restoring those areas to their formerly beneficial role as wetlands once construction is completed. These alternatives will have minimal impact on the wetlands during operation in that the dewatered area will be minimal as low permeability will reduce the size of the cone of depression. The greatest impact on wetlands will be the construction of the extraction system which will alter an area of 350 feet by 40 feet. This alteration will be temporary as the grades within the construction area will be returned to the present undisturbed topography once the extraction system is installed. Additionally, the cone of depression from the pumping of a trench or a series of wells will dewater a very narrow area (10 feet). The type of wetland will be altered from a forested wetland to a shrub-scrub type wetland as the construction area revegetates.

EO 11988 has the goal of maintaining the character of floodplains and minimizing the impact of floods on human health and safety. This goal is accomplished by minimizing construction within floodplains. The management of migration alternatives that utilize groundwater treatment (MM-3, MM-4, MM-5, and MM-6) would affect the area to a minimal extent. These alternatives would either add only a small building (less than 1,000 square feet) to an area that already is moderately developed, or would feature no above ground structures at all if the existing building is deemed suitable to house the treatment plant.

ESTIMATED TIME FOR CONSTRUCTION: 2 years
 ESTIMATED TIME FOR OPERATION: 10 to 15 years
 ESTIMATED CAPITAL COST: \$3,158,000
 ESTIMATED O & M (Present Worth): \$1,032,000
 ESTIMATED TOTAL COST (Present worth): \$4,275,000

MM-4

Ground Water Extraction, On-Site Treatment, and Discharge to Surface Water

This alternative features the same extraction and treatment system as MM-3; however, in this case the discharge water is discharged to the surface water by a diffuser constructed on the bottom of Pequawket Pond.

ARARs will be the same as for MM-3; however, treatment must also comply with substantive National Pollutant Discharge Elimination System (NPDES) requirements. NPDES requirements, due to Ambient Water Quality Criteria may be more stringent and require more compliance monitoring than would be associated with other alternatives. NPDES discharge restrictions for certain metals that are found in the ground water at the Site are very stringent. The NPDES limits set for mercury (0.012 ppb) are lower than the analysis detection limits that were used to quantify mercury at the Site (0.3 ppb). Therefore, it is uncertain whether NPDES limits for mercury could be met.

ESTIMATED TIME FOR CONSTRUCTION: 2 years
 ESTIMATED TIME FOR OPERATION: 10 years
 ESTIMATED CAPITAL COST: \$2,891,000
 ESTIMATED O & M (Present Worth): \$1,032,000
 ESTIMATED TOTAL COST (Present worth): \$4,008,000

MM-5

Ground Water Extraction, On-Site Treatment, and Discharge to Publicly Owned Treatment Works (POTW)

The discharge of treated ground water would be through a new sewer connection from the on-site treatment building to the public sewer system for conveyance to the POTW.